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Verwey transition and magnetic irreversibility in nanocrystalline magnetite produced by magnetotactic bacteria T. PROZOROV, Ames Laboratory, R. PROZOROV, Ames Laboratory and Department of Physics & Astronomy, Iowa State University, Ames IA, T.J. WILLIAMS, Ames Laboratoty, Ames IA, D.A. BAZYLINSKI, School of Life Sciences, University of Nevada, Las Vegas, NV, S.K. MALLAPRAGADA, Ames Laboratory and Department of Chemical and Biological Engineering, Iowa State University, Ames IA, B. NARASIMHAN, Department of Chemical and Biological Engineering, Iowa State University, Ames IA — Magnetic properties of 50 nm magnetite nanocrystals from different strains of magnetotactic bacteria are compared to high quality single crystal. It is found that the Verwey transition depends mostly on the particle shape. It is sharpest and occurs at a temperature approaching bulk values in elongated nanoparticles from MV-1 bacteria. This result contradicts previous reports of the Verwey temperature reduction in nanoparticles. Magnetic irreversibility below the Verwey transition shows thermal-history dependence and, in nanoparticles, is strongly influenced by the interparticle interactions. Collected data are analyzed in terms of the interplay between crystalline and shape anisotropies as well as collective behavior of the nanoparticles.

[X] Prefer Oral Session
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